

# PATENT COOPERATION TREATY

# PCT

## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY


(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

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Applicant's or agent's file reference 904417	<b>FOR FURTHER ACTION</b>		See Form PCT/IPEA/416
International application No. PCT/JP2004/018226	International filing date (day/month/year) 30.11.2004	Priority date (day/month/year) 19.12.2003	
International Patent Classification (IPC) or national classification and IPC INV. B60K41/28			
Applicant TOYOTA JIDOSHA KABUSHIKI KAISHA et al.			
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 5 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> sent to the applicant and to the International Bureau) a total of 13 sheets, as follows:</p> <p><input type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input checked="" type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in electronic form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>			
<p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the report</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input type="checkbox"/> Box No. VI Certain documents cited</p> <p><input checked="" type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input checked="" type="checkbox"/> Box No. VIII Certain observations on the international application</p>			
Date of submission of the demand  27.07.2005		Date of completion of this report  29.03.2006	
Name and mailing address of the international preliminary examining authority:  European Patent Office - Gitschiner Str. 103 D-10958 Berlin Tel. +49 30 25901 - 0 Fax: +49 30 25901 - 840		Authorized officer  Tamme, H-M  Telephone No. +49 30 25901-542	



**INTERNATIONAL PRELIMINARY REPORT  
ON PATENTABILITY**

International application No.  
PCT/JP2004/018226

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**Box No. I Basis of the report**

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1. With regard to the **language**, this report is based on
- ☒ the international application in the language in which it was filed
  - ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of:
    - ☐ international search (under Rules 12.3(a) and 23.1(b))
    - ☐ publication of the international application (under Rule 12.4(a))
    - ☐ international preliminary examination (under Rules 55.2(a) and/or 55.3(a))
2. With regard to the **elements\*** of the international application, this report is based on (*replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report*):

**Description, Pages**

1-39 as originally filed

**Claims, Numbers**

1-34 received on 27.07.2005 with letter of 25.07.2005

**Drawings, Sheets**

1/10-10/10 as originally filed

- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☐ The amendments have resulted in the cancellation of:
- ☐ the description, pages
  - ☐ the claims, Nos.
  - ☐ the drawings, sheets/figs
  - ☐ the sequence listing (*specify*):
  - ☐ any table(s) related to sequence listing (*specify*):
4. ☒ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
- ☐ the description, pages
  - ☒ the claims, Nos. 1-5, 18-22
  - ☐ the drawings, sheets/figs
  - ☐ the sequence listing (*specify*):
  - ☐ any table(s) related to sequence listing (*specify*):

\* If item 4 applies, some or all of these sheets may be marked "superseded."

**INTERNATIONAL PRELIMINARY REPORT  
ON PATENTABILITY**

International application No.  
PCT/JP2004/018226

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**Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

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1. Statement

Novelty (N)	Yes: Claims	
	No: Claims	1-34
Inventive step (IS)	Yes: Claims	
	No: Claims	1-34
Industrial applicability (IA)	Yes: Claims	1-34
	No: Claims	

2. Citations and explanations (Rule 70.7):

**see separate sheet**

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**Box No. VII Certain defects in the international application**

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The following defects in the form or contents of the international application have been noted:

**see separate sheet**

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**Box No. VIII Certain observations on the international application**

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The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

**see separate sheet**

**Re Item V**

**Reasoned statement with regard to novelty, inventive step or industrial applicability;  
citations and explanations supporting such statement**

- 1 Reference is made to the following documents:  
D1: GB 2318106 A  
D2: US 2002/0016659 A
  
- 2 With respect to claim 1, D1 discloses a vehicle integrated control system comprising a plurality of control units (8, 9, 10, 11) operating autonomously for controlling a running state of a vehicle based on a manipulation request, wherein each control unit (8, 9, 10, 11) comprises a sensing unit (implicit) for sensing an operation request with respect to at least one control unit (8, 9, 10, 11) and a controller (7) for controlling said vehicle by generating a control target based on a sensed request, and manipulating an actuator set in correspondence with each unit, using said control target, said system further comprising a processing unit (6) operating parallel to each said control units (8, 9, 10, 11), for generating and providing to each said control unit (8, 9, 10, 11) information to be used to modify said operation request or said control target (implicit), as necessary, at each said control unit (8, 9, 10, 11).  
  
Thus, D1 discloses all the features of claim 1.
  
- 3 Referring to independent claims 2 to 5 and 18 to 22, D1 also discloses substantially all the features of these independent claims either explicitly or implicitly.
  
- 4 Dependent claims 6 to 17 and 23 to 34 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty and/or inventive step, because they are either implicitly disclosed by D1 or generally known in the particular field of control systems.

In particular the features of claim 7 which possibly should have been subject of the intended amendment are already known from D1.

- 5 Moreover, an analog reasoning as given above may also be followed with document D2.

**Re Item VII**

**Certain defects in the international application**

- 1 Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the documents D1 and D2 is not mentioned in the description, nor are these documents identified therein.

**Re Item VIII**

**Certain observations on the international application**

- 1 The present application does not fulfill the requirements of Article 6 in combination with Rule 6.1(a) PCT, because the present set of claims lacks conciseness, see also PCT/GL/ISPE/1 Appendix to Chapter 5 "Conciseness".

## CLAIMS

1. (Amended) A vehicle integrated control system comprises a plurality of control units (PT, ECB, STR) operating autonomously for controlling a running state of a vehicle based on a manipulation request,

wherein each control unit (PT, ECB, STR) comprises a sensing unit for sensing an operation request with respect to at least one control unit (PT, ECB, STR), and

a controller for controlling said vehicle by generating a control target based on a sensed request, and manipulating an actuator set in correspondence with each unit, using said control target,

said system further comprising

a processing unit (DSS, VDM) operating parallel to each said control unit (PT, ECB, STR), for generating and providing to each said control unit (PT, ECB, STR) information to be used to modify said operation request or said control target, as necessary, at each said control unit (PT, ECB, STR),

said control unit or said processing unit generating information processed such that said sensed request is shared among each of said control unit (PT, ECB, STR).

2. (Amended) A vehicle integrated control system comprising: a plurality of control units (PT, ECB, STR) controlling a running state of a vehicle based on a manipulation request, and

a processing unit (DSS, VDM) generating information to be used at each said control unit (PT, ECB, STR) based on environmental information around said vehicle or information related to a driver, and providing the generated information to each said control unit (PT, ECB, STR),

wherein each said control unit (PT, ECB, STR) comprises

a sensing unit for sensing an operation request with respect to at least one

control unit (PT, ECB, STR), and

a calculation unit for calculating information related to a control target to manipulate an actuator set in correspondence with each unit using at least one of said information generated at said processing unit (DSS, VDM) and said sensed operation request,

said control unit or said processing unit generating information processed such that said sensed request is shared among each of said control unit (PT, ECB, STR).

3. (Amended) A vehicle integrated control system comprising:

a plurality of control units (PT, ECB, STR) controlling a running state of a vehicle based on a manipulation request, and

a processing unit (DSS, VDM) generating information to be used at each said control unit (PT, ECB, STR) to cause said vehicle to realize a predetermined behavior, and providing the generated information to each said control unit (PT, ECB, STR),

wherein each said control unit (PT, ECB, STR) comprises

a sensing unit for sensing an operation request with respect to at least one control unit (PT, ECB, STR) and

a calculation unit for calculating information related to a control target to manipulate an actuator set in correspondence with each unit using at least one of said information generated by said processing unit (DSS, VDM) and said sensed operation request,

said control unit or said processing unit generating information processed such that said sensed request is shared among each of said control unit (PT, ECB, STR).

4. (Amended) A vehicle integrated control system comprising:

a plurality of control units (PT, ECB, STR) controlling a running state of a vehicle based on a manipulation request, and

a processing unit (DSS, VDM) generating information to be used at each said

control unit (PT, ECB, STR) based on a current dynamic state of said vehicle, and providing the generated information to each said control unit (PT, ECB, STR),

wherein each said control unit (PT, ECB, STR) comprises

5 a sensing unit for sensing an operation request with respect to at least one control unit (PT, ECB, STR), and

a calculation unit for calculating information related to a control target to manipulate an actuator set in correspondence with each unit using at least one of said information generated by said processing unit (DSS, VDM) and said sensed operation request,

10 said control unit or said processing unit generating information processed such that said sensed request is shared among each of said control unit (PT, ECB, STR).

5. (Amended) A vehicle integrated control system comprising:

15 a plurality of control units (PT, ECB, STR) controlling a running state of a vehicle based on a manipulation request,

a first processing unit (DSS, VDM) generating information to be used at each said control unit (PT, ECB, STR) based on environmental information around said vehicle or information related to a driver, and providing the generated information to each said control unit (PT, ECB, STR),

20 a second processing unit (DSS, VDM) generating information to be used at each said control unit (PT, ECB, STR) to cause said vehicle to realize a predetermined behavior, and providing the generated information to each said control unit (PT, ECB, STR), and

25 a third processing unit (DSS, VDM) generating information to be used at each said control unit (PT, ECB, STR) based on a current dynamic state of said vehicle, and providing the generated information to each said control unit (PT, ECB, STR),

wherein each said control unit (PT, ECB, STR) comprises

a sensing unit for sensing an operation request with respect to at least one



control unit (PT, ECB, STR), and

a first calculation unit for calculating first information related to a control target to manipulate an actuator set in correspondence with each unit using at least one of said information generated at said first processing unit (DSS, VDM) and said sensed operation request,

a second calculation unit for calculating second information related to a control target to manipulate an actuator set in correspondence with each unit using at least one of said information generated at said second processing unit (DSS, VDM) and said calculated first information, and

a third calculation unit for calculating third information related to a control target to manipulate an actuator set in correspondence with each unit using at least one of said information generated at said third processing unit (DSS, VDM) and said calculated second information,

said control unit or said processing unit generating information processed such that said sensed request is shared among each of said control unit (PT, ECB, STR).

6. The vehicle integrated control system according to any of claims 2-5, wherein each unit operates autonomously and in parallel.

7. The vehicle integrated control system according to claim 1, 2 or 5, wherein said processing unit (DSS, VDM) or said first processing unit (DSS, VDM) comprises a sensing unit for sensing environmental information around said vehicle, a sensing unit for sensing information related to a driver of said vehicle, and a processing unit generating information processed such that said sensed information is shared among each of said control unit (PT, ECB, STR).

8. The vehicle integrated control system according to claim 7, wherein said processing unit generates information representing a degree of correction with respect

to a request of said driver at each said control unit (PT, ECB, STR).

9. The vehicle integrated control system according to claim 1, 3, or 5,  
wherein said processing unit (DSS, VDM) or said second processing unit (DSS, VDM)  
5 comprises a processing unit generating information processed so as to be shared among  
each said control unit (PT, ECB, STR), based on information for implementation of  
automatic cruising or pseudo automatic cruising of said vehicle.

10. The vehicle integrated control system according to claim 9, wherein said  
10 processing unit generates information representing a degree of arbitration with respect  
to said control target at each said control unit (PT, ECB, STR).

11. The vehicle integrated control system according to claim 1, 4 or 5,  
wherein said processing unit (DSS, VDM) or said third processing unit (DSS, VDM)  
15 comprises a processing unit generating information processed so as to be shared among  
each said control unit (PT, ECB, STR) to realize a behavior of the vehicle consistent  
with a control target, based on a current dynamic state of the vehicle.

12. The vehicle integrated control system according to claim 11, wherein said  
20 processing unit generates information representing a degree of arbitration with respect  
to said control target at each said control unit (PT, ECB, STR).

13. The vehicle integrated control system according to any of claims 1-5,  
wherein said control unit (PT, ECB, STR) comprises a driving system control unit (PT,  
25 ECB, STR) and a brake system control unit (PT, ECB, STR),

wherein said driving system control unit (PT, ECB, STR) and said brake  
system control unit (PT, ECB, STR) have a driving force and braking force distributed  
with respect to a requested driving force so as to realize a desired behavior of the

vehicle in co-operation.

14. The vehicle integrated control system according to any of claims 1-5,  
wherein each said control unit (PT, ECB, STR) provides control such that reflection of  
5 information from said processing unit is rejected.

15. The vehicle integrated control system according to any of claims 3-5,  
wherein each said control unit (PT, ECB, STR) outputs information to said processing  
unit (DSS, VDM), said second processing unit (DSS, VDM) or said third processing  
10 unit (DSS, VDM).

16. The vehicle integrated control system according to any of claims 1-5,  
wherein each said control unit (PT, ECB, STR) is realized by each ECU, and operation  
is executed at said each ECU from an upper control hierarchy corresponding to a  
15 request of a driver towards a lower control hierarchy corresponding to each actuator.

17. The vehicle integrated control system according to any of claims 1-5,  
wherein  
said driving system control unit (PT, ECB, STR) is realized by a first ECU,  
20 said brake system control unit is realized by a second ECU,  
said steering system control unit is realized by a third ECU,  
operation is executed from an upper control hierarchy corresponding to a  
request of a driver towards a lower control hierarchy corresponding to each actuator at  
each said ECU,  
25 said processing unit (DSS, VDM) is realized by a fourth ECU differing from  
said first, second and third ECUs,  
said first to third ECUs have an operation controlled in parallel,  
said fourth ECU is connected to an upper control hierarchy side of said first to

third ECUs via an interface.

18. (Amended) A vehicle integrated control system comprises a plurality of control units (PT, ECB, STR) operating autonomously for controlling a running state of a vehicle based on a manipulation request,

wherein each said control unit (PT, ECB, STR) comprises sensing means for sensing an operation request with respect to at least one control unit (PT, ECB, STR), and

controller means for controlling said vehicle by generating a control target based on a sensed request, and manipulating an actuator set in correspondence with each unit, using said control target,

said system further comprising

a processing unit (DSS, VDM) operating parallel to each said control unit (PT, ECB, STR) for generating and providing to each said control unit (PT, ECB, STR) information to be used to modify said operation request or said control target, as necessary, at each said control unit (PT, ECB, STR),

said control unit or said processing unit generating information processed such that said sensed request is shared among each of said control unit (PT, ECB, STR).

19. (Amended) A vehicle integrated control system comprising: a plurality of control units (PT, ECB, STR) controlling a running state of a vehicle based on a manipulation request, and

a processing unit (DSS, VDM) generating information to be used at each said control unit (PT, ECB, STR) based on environmental information around said vehicle or information related to a driver, and providing the generated information to each said control unit (PT, ECB, STR),

wherein each said control unit (PT, ECB, STR) comprises

sensing means for sensing an operation request with respect to at least one

control unit (PT, ECB, STR), and

a calculation unit for calculating information related to a control target to manipulate an actuator set in correspondence with each unit using at least one of said information generated at said processing unit (DSS, VDM) and said sensed operation request,

said control unit or said processing unit generating information processed such that said sensed request is shared among each of said control unit (PT, ECB, STR).

20. (Amended) A vehicle integrated control system comprising:

a plurality of control units (PT, ECB, STR) controlling a running state of a vehicle based on a manipulation request, and

a processing unit (DSS, VDM) generating information to be used at each said control unit (PT, ECB, STR) to cause said vehicle to realize a predetermined behavior, and providing the generated information to each said control unit (PT, ECB, STR),

wherein each said control unit (PT, ECB, STR) comprises sensing means for sensing an operation request with respect to at least one control unit (PT, ECB, STR) and

calculation means for calculating information related to a control target to manipulate an actuator set in correspondence with each unit using at least one of said information generated by said processing unit (DSS, VDM) and said sensed operation request,

said control unit or said processing unit generating information processed such that said sensed request is shared among each of said control unit (PT, ECB, STR).

21. (Amended) A vehicle integrated control system comprising:

a plurality of control units (PT, ECB, STR) controlling a running state of a vehicle based on a manipulation request, and

a processing unit (DSS, VDM) generating information to be used at each said

control unit (PT, ECB, STR) based on a current dynamic state of said vehicle, and providing the generated information to each said control unit (PT, ECB, STR),

wherein each said control unit (PT, ECB, STR) comprises

5 sensing means for sensing an operation request with respect to at least one control unit (PT, ECB, STR), and

calculation means for calculating information related to a control target to manipulate an actuator set in correspondence with each unit using at least one of said information generated by said processing unit (DSS, VDM) and said sensed operation request,

10 said control unit or said processing unit generating information processed such that said sensed request is shared among each of said control unit (PT, ECB, STR).

22. (Amended) A vehicle integrated control system comprising:

15 a plurality of control units (PT, ECB, STR) controlling a running state of a vehicle based on a manipulation request,

a first processing unit (DSS, VDM) generating information to be used at each said control unit (PT, ECB, STR) based on environmental information around said vehicle or information related to a driver, and providing the generated information to each said control unit (PT, ECB, STR),

20 a second processing unit (DSS, VDM) generating information to be used at each said control unit (PT, ECB, STR) to cause said vehicle to realize a predetermined behavior, and providing the generated information to each said control unit (PT, ECB, STR), and

25 a third processing unit (DSS, VDM) generating information to be used at each said control unit (PT, ECB, STR) based on a current dynamic state of said vehicle, and providing the generated information to each said control unit (PT, ECB, STR),

wherein each said control unit (PT, ECB, STR) comprises

sensing means for sensing an operation request with respect to at least one

control unit (PT, ECB, STR), and

first calculation means for calculating first information related to a control target to manipulate an actuator set in correspondence with each unit using at least one of said information generated at said first processing unit (DSS, VDM) and said sensed operation request,

second calculation means for calculating second information related to a control target to manipulate an actuator set in correspondence with each unit using at least one of said information generated at said second processing unit (DSS, VDM) and said calculated first information, and

third calculation means for calculating third information related to a control target to manipulate an actuator set in correspondence with each unit using at least one of said information generated at said third processing unit (DSS, VDM) and said calculated second information,

said control unit or said processing unit generating information processed such that said sensed request is shared among each of said control unit (PT, ECB, STR).

23. The vehicle integrated control system according to any of claims 19-22, wherein each unit operates autonomously and in parallel.

24. The vehicle integrated control system according to claim 18, 19 or 22, wherein said processing unit (DSS, VDM) or said first processing unit (DSS, VDM) comprises

means for sensing environmental information around said vehicle,  
means for sensing information related to a driver of said vehicle, and  
processing means for generating information processed such that said sensed information is shared among each said control unit (PT, ECB, STR).

25. The vehicle integrated control system according to claim 24, wherein said

processing means includes means for generating information representing a degree of correction with respect to a request of said driver at each said control unit (PT, ECB, STR).

5           26. The vehicle integrated control system according to claim 18, 20, or 22, wherein said processing unit (DSS, VDM) or said second processing unit (DSS, VDM) comprises processing means for generating information processed so as to be shared among each said control unit (PT, ECB, STR), based on information for implementation of automatic cruising or pseudo automatic cruising of said vehicle.

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27. The vehicle integrated control system according to claim 26, wherein said processing means includes means for generating information representing a degree of arbitration with respect to said control target at each said control unit (PT, ECB, STR).

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28. The vehicle integrated control system according to claim 18, 21 or 22, wherein said processing unit (DSS, VDM) or said third processing unit (DSS, VDM) comprises processing means for generating information processed so as to be shared among each said control unit (PT, ECB, STR) to realize a behavior of the vehicle consistent with a control target, based on a current dynamic state of said vehicle.

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29. The vehicle integrated control system according to claim 28, wherein said processing means includes means for generating information representing a degree of arbitration with respect to said control target at each said control unit (PT, ECB, STR).

25

30. The vehicle integrated control system according to any of claims 18-22, wherein said control unit (PT, ECB, STR) comprises a driving system control unit (PT, ECB, STR) and a brake system control unit (PT, ECB, STR),  
wherein said driving system control unit (PT, ECB, STR) and said brake



system control unit (PT, ECB, STR) have a driving force and braking force distributed with respect to a requested driving force so as to realize a desired behavior of the vehicle in co-operation.

5                    31. The vehicle integrated control system according to any of claims 18-22, wherein each said control unit (PT, ECB, STR) further includes means for controlling such that reflection of information from said processing means is rejected.

10                    32. The vehicle integrated control system according to any of claims 20-22, wherein each said control unit (PT, ECB, STR) further includes means for providing information to said processing unit (DSS, VDM), said second processing unit (DSS, VDM) or said third processing unit (DSS, VDM).

15                    33. The vehicle integrated control system according to any of claims 18-22, wherein each said control unit (PT, ECB, STR) is realized by each ECU, and operation is executed at said each ECU from an upper control hierarchy corresponding to a request of a driver towards a lower control hierarchy corresponding to each actuator.

20                    34. The vehicle integrated control system according to any of claims 18-22, wherein  
                          said driving system control unit (PT, ECB, STR) is realized by a first ECU,  
                          said brake system control unit is realized by a second ECU,  
                          said steering system control unit is realized by a third ECU,  
                          operation is executed from an upper control hierarchy corresponding to a  
 25                    request of a driver towards a lower control hierarchy corresponding to each actuator at each said ECU,  
                          said processing unit (DSS, VDM) is realized by a fourth ECU differing from said first, second and third ECUs,

said first to third ECUs have an operation controlled in parallel, and  
said fourth ECU is connected to an upper control hierarchy side of said first to  
third ECUs via an interface.